

Claims 1 and 2 now recite the feature that “an enlarged diameter portion integrally formed on a shaft portion of the fastening bolt acts as the fastening means for abutting the end face of the sleeve.” As can be seen from Figs. 1, 5 and 6 of the present application, this feature makes it possible to reduce the diameter of the bolt hole aperture of the outer surface of the casing, since the diameter of the fastening bolt protruding from the outer surface of the casting can be reduced to a value smaller than the diameter of the fastening means. Further, as the fastening means does not abut against the outer surface of the casing, a spot facing is not required for the outer surface of the casing.

By eliminating the necessity of the spot facing, it becomes possible to reduce the spacing of the fastening bolts (the bolt pitch) and increase the tightening force of the casing (see page 15, line 35 to page 16, line 3 of the specification).

Further, by reducing the diameter of the bolt hole aperture of the casing, the flexural rigidity of the casing wall can be increased by increasing the geometric moment of inertia of the casing (see page 17, lines 18 through 31 in the specification). In the present invention, since only the shaft (without the sleeve) protrudes from the casing, the diameter of the bolt hole aperture can be reduced to a value substantially the same as (or slightly larger than) the diameter of the shaft of the fastening bolt (see Figs. 5 and 6). This advantage evidently cannot be obtained by the fastening arrangement disclosed in Swiss ‘458.

Further, by providing a fastening means (an enlarged portion) on the shaft portion of the bolt, the portion of the shaft outside of the enlarged portion is only used for tightening the bolt, i.e., no tensile strength is exerted on this portion of the shaft once the bolt has been tightened. This means that the diameter of the bolt can be reduced to a value sufficient for enduring the tightening torque of the bolt only during a short period (i.e., during the tightening operation). This makes it possible to further reduce the diameter of the portion of

the shaft protruding from the casing, and therefore the diameter of the bolt hole aperture can be further reduced.

Claim 3 was rejected under 35 U.S.C. § 103 as being obvious over the admitted prior art of Figure 8 in view of Swiss '458. The Examiner there alleged that it would have been obvious for those skilled in the art to have replaced the bolt and nut arrangement of Swiss '458 — as introduced into the casing of the admitted prior art — with a bolt having a hex head. Claim 3 was also rejected under 35 U.S.C. § 103 as being obvious over JP '204 in view of Swiss '458. There again, the Examiner alleged that it would have been obvious for those skilled in the art to have replaced the bolt and nut arrangement of Swiss '458 — as introduced into the casing of JP '204 — with a bolt having a hex head. However, these rejections are respectfully traversed.

With respect to the subject matter of Claim 3 which has been introduced into Claims 1 and 2, as discussed above, this feature makes it possible to reduce the diameter of the bolt hole aperture of the outer surface of the casing, to reduce the spacing of the fastening bolts (the bolt pitch) and increase the tightening force of the casing, to increase the flexural rigidity of the casing wall, and to further reduce the diameter of the portion of the shaft protruding from the casing. In view of these improved results, and in view of the lack of a purported motivation for modifying Swiss '458 to replace a hex head with a nut ("joining the casings together" is not a motivation for such a modification, since the nut of Swiss '458 also provides the function joining the casings together), Applicant respectfully submits that amended Claims 1 and 2, which recite the subject matter of cancelled Claim 3, define over the prior art.

Beyond this, Applicant respectfully submits that the subject matter of Claims 1 and 2, as previously set forth, also define over the prior art, i.e., it would not have been obvious for

those skilled in the art to have modified the admitted prior art or JP '207 by introducing the bolt and sleeve arrangement of Swiss '458. Applicant had previously pointed to the synergy resulting from the use of a sleeve in a tangential bolt hole, as in the present invention: a reduction in the thinning of the casing. The sleeve in combination with a tangential bolt hole thus overcomes a problem *unique* to tangential bolt holes, i.e., one that does not arise for configurations in which the bolt holes are in laterally extending flanges.

The Examiner has recognized that M.P.E.P. § 2141 states that a synergistic result is not necessary for a finding of non-obviousness. However, the Examiner has also recognized that the M.P.E.P. states that "synergism may point toward non-obviousness." Thus, the absence of synergism does not detract from non-obviousness, but its presence points to non-obviousness. *The Examiner has not addressed why it would have been obvious to have combined the admitted prior art or JP '207 with Swiss '458, despite the presence of synergism which points "toward non-obviousness."*

The Examiner has also noted that the claims do not recite the advantage of overcoming the thinning of the casing due to the large bolt hole diameters by using a sleeve which permits a smaller bolt hole size. However, the Examiner's attention is respectfully directed to the fact that it is the function of the claims to recite the invention, not its advantages. Nonetheless, unexpected advantages which provide evidence of unobviousness cannot properly be ignored.

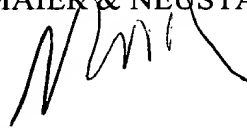
Applicant therefore respectfully submits that the amended claims define over any combination of the admitted prior art and Japanese '207 in view of Swiss '458.

In a separate letter, Applicant is submitting formal drawings which incorporate the changes approved by the Examiner.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicits an early Notice of Allowability.

Respectfully submitted,

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IN THE CLAIMS

--1. (Three Times Amended) A fastening arrangement for a split casing assembled by fastening a plurality of casing segments, comprising:

a first and a second casing segment assembled together by joining joint faces of the respective segments, said first and second casing segments are provided with bolt holes in such a manner that the bolt hole of the first casing segment and the bolt hole of the second casing segment align with each other and, when the first and the second casing segments are assembled together, form a continuous bolt hole crossing the joint faces and extending tangentially in walls of both casing segments, the walls of the casing segments separating an interior of a hollow casing from an exterior of the hollow casing, and at least the bolt hole in the first casing segment is provided with an [external] internal screw thread;

a sleeve having an external screw thread and being fitted into the bolt hole of the first casing segment by engaging the external screw thread of the sleeve with the internal screw thread of the bolt hole of the first casing segment; and

a fastening bolt provided with [fastening means] an enlarged diameter portion integrally formed on a shaft portion of the fastening bolt, and passing through the bolt hole of the first casing segment and the sleeve therein, wherein said [fastening means] enlarged diameter portion abuts an end of the sleeve opposite to the joint face and, when a tensile force is exerted on the fastening bolt at the portion between the [fastening means] enlarged

diameter portion and the second casing segment, the tensile force is first transferred from the fastening bolt to the sleeve through the abutment of the [fastening means] enlarged diameter portion and the end face of the sleeve, then transferred from the sleeve to the first casing segment through the engagement of the external screw thread of the sleeve and internal screw thread of the bolt hole and generates a fastening force for pressing the first casing segment against the second casing segment.

2. (Three Times Amended) A fastening arrangement for a horizontally split type hollow casing for a hydraulic machine in which the casing of the hydraulic machine is assembled by fastening two casing halves, comprising:

a first and a second casing half assembled together by joining joint faces of the respective casing halves, said first and second casing halves are provided with bolt holes in such a manner that the bolt hole of the first casing half and the bolt hole of the second casing half align with each other and, when the first and the second casing halves are assembled together, form a continuous bolt hole crossing the joint faces and extending tangentially in walls of both casing halves, the walls of the casing halves separating an interior of the split type hollow casing from an exterior of the split type hollow casing, said bolt holes in the first and the second casing halves are provided with internal screw threads;

a sleeve having an external screw thread and being fitted into the bolt hole of the first casing half by engaging the external screw thread of the sleeve with the internal screw thread of the bolt hole of the first casing half; and

a fastening bolt provided with an external screw thread at one end for engaging the internal screw thread of the bolt hole in the second casing half and [fastening means] an enlarged diameter portion integrally formed on a shaft portion of the fastening bolt at [the] a portion apart from said external screw thread, said fastening bolt passing through the bolt

hole of the first casing half and the sleeve therein, wherein said [fastening means] enlarged diameter portion abuts an end of the sleeve opposite to the joint face when the fastening bolt is screwed into the bolt hole in the second casing half, whereby a tensile force generated in the fastening bolt by screwing the fastening bolt into the bolt hole in the second casing half is first transferred from the fastening bolt to the sleeve through the abutment of the [fastening means] enlarged diameter portion and the end face of the sleeve, then transferred from the sleeve to the first casing segment through the engagement of the external screw thread of the sleeve and internal screw thread of the bolt hole in the first casing half and generates a fastening force for pressing the first casing half against the second casing half.

3. (Cancelled).--